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Mr. William H. Ruland
Director, Division of Safety Systems
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Subject: GSI-191 – Current Status and Recommended Actions for Closure

Project Number: 689

Dear Mr. Ruland:

While measures taken thus far in response to Generic Safety Issue (GSI) 191, *PWR Sump Performance*, have contributed greatly to the safety of U.S. nuclear power plants, final resolution has proven to be difficult. Nevertheless, the industry continues to believe that it is important to take the actions necessary to ensure that a stable resolution of this long-standing issue is attained. The purpose of this letter is to summarize the current status of industry activities associated with resolution of GSI-191 and identify a recommended course of actions necessary to bring this long-standing issue to a stable and durable closure.

Current Status

The Commission, in their December 23, 2010 Staff Requirements Memorandum (SRM), made a number of important points on the status of industry GSI-191 resolution efforts. Key among these points was that measures taken by the industry to address GSI-191 have greatly improved the safety of U.S. nuclear power plants and that adequate defense-in-depth is being maintained. Industry test and analysis efforts in 2011 continue to support this conclusion.

The SRM concluded that resolution of GSI-191 through deterministic means alone, while possible for some PWR licensees, may prove to be too short-sighted and require actions that are both impractical and unnecessary when evaluated in the broader context of risk. The complexities of GSI-191 make it necessary to carefully weigh safety significance, occupational dose, and other relevant risk-informed considerations. The SRM directed the staff to fully explore the policy and technical implications of all available alternatives to risk-informing the path forward.

We believe that efforts to develop risk-informed resolution options for GSI-191 continue to show strong promise. While progress on many of the risk-informed alternatives proposed by industry has been protracted, there has been significant progress on the risk-informed resolution effort that is being piloted by STPNOC for application to STP units 1 and 2. The STP effort is following guidance contained in Regulatory Guide 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," and is on target for submittal of a license amendment request by December 31, 2012.

The industry action plan currently incorporates the STP risk-informed approach as the sole alternative to the fully deterministic resolution path. It is important that all available alternatives for risk-informing the path forward be explored in order to provide options that bridge the gap between fully deterministic and fully risk-informed. A greater priority should be given to consideration of risk-informed alternatives proposed by NEI in the July 5, 2011 response to a May 3, 2011 Federal Register Notice request for potential GSI-191 resolution alternatives. A risk-informed treatment of debris generation was proposed in this letter and was discussed during a September 21, 2011 public meeting. While no technical issues have been identified with this proposal, further consideration appears to be awaiting policy direction. We urge the NRC to seek direction on any policy implications for this proposal at the earliest opportunity.

The July 5, 2011 NEI letter also proposed a risk-informed treatment of non-conformances related to ECCS sump recirculation. Such treatment would utilize risk insights to provide additional time to restore the affected systems when the cause of a non-conformance is a very low probability condition. This proposal is especially important for plants choosing to resolve GSI-191 using current deterministic methods. The development and approval of this proposal is a necessary condition for plants choosing a deterministic resolution path.

The industry, through extensive testing and modifications, has made large investments in understanding and mitigating the effects of post-LOCA debris generation, debris transport, sump screen effectiveness, and, most recently, in-vessel effects of the debris that bypasses the sump screens. The interpretations of the limited PWROG testing program to quantify the allowed sump screen debris bypass (in-vessel effects), completed in 2011, resulted in sump screen debris bypass limits that are impractical for long-term plant operation and overly conservative for every U. S. PWR. These limits are a direct result of attempts to bound the entire U.S. PWR fleet with a limited number of tests. The testing program conservatively addressed a broad set of conditions and used a simple test arrangement that did not attempt to address several key sources of conservatism. This approach has necessitated the need to perform additional tests that incorporate factors for discrete PWR designs and address known sources of conservatism. The staff has also indicated that further in-vessel debris testing should consider the impact of debris on boric acid precipitation. Consideration of boric acid precipitation will involve a separate set of tests.

Prior to proceeding with the testing necessary to resolve in-vessel debris limits, the industry believes it is advisable to conduct an independent review of completed tests to determine what changes or improvements are needed in test conditions and protocols in order to provide a greater level of

assurance that unnecessary constraints on test results are eliminated. This action will support development of a complete schedule for planned in-vessel tests that will be discussed with the NRC upon completion.

Recommended Actions for Closure

We recognize and acknowledge the need to provide the Commission with a clearly defined action plan for resolution of GSI-191 for all PWRs. The action plan, outlined below, provides a defined set of actions that is based on the degree of current reliance on fibrous insulation within containment. This action plan has been discussed with industry chief nuclear officers and has received general acceptance. These discussions are continuing to ensure full acceptance of the action plan.

Industry Action Plan for PWRs with Substantial Amounts of Fibrous Insulation

- Licensees of PWRs with substantial quantities of fibrous insulation will provide a docketed submittal to the NRC by December 31, 2012 that outlines a GSI-191 resolution path and schedule. There are 11 sites (17 units) that currently have substantial amounts of fibrous insulation. STP is currently piloting a risk-informed resolution approach for GSI-191, for which a separate schedule has been established.
- As a proactive action, the submittal will identify a schedule to perform containment measurements for modification or replacement of fibrous insulation. This action would generally be performed during the first outage opportunity following the submittal.
- The submittal will identify one of two resolution paths: deterministic or risk-informed.
 - If a deterministic resolution path is identified, the submittal will identify a schedule for replacement or modification of containment insulation. Insulation replacement/modification actions would be completed on or before the end of the third refueling outage after January 1, 2013.
 - If a risk-informed resolution path is identified, the submittal would identify a schedule for submittal of a license amendment request (LAR) providing a basis for any design or operational changes necessary to resolve GSI-191. The LAR submittal would be scheduled to occur in the period 6 to 12 months following issuance of the NRC Safety Evaluation Report on the STP risk-informed GSI-191 resolution pilot.
- The submittal will also include a summary of actions and measures that have already been taken to minimize the impact of debris blockage, identify known areas of conservatism in methods applied to date, and identify defense-in-depth measures that have been, or will be, taken, to mitigate residual risks during the time required to complete remaining actions.

Industry Action Plan for PWRs with Minimal Fibrous Insulation

- Licensees of PWRs that have minimal quantities of fibrous insulation will provide a docketed submittal to the NRC by December 31, 2012 that outlines a GSI-191 resolution path and schedule. There are approximately 18 sites (34 units) that currently have little to no fibrous insulation and can meet very low in-vessel debris limits.

- The submittal will provide a summary of actions and measures that have been taken to minimize the impact of debris blockage and will identify the resolution status of GSI-191 utilizing current, very conservative, in-vessel debris limits.
- The restrictiveness of the current in-vessel debris limits prevents a stable resolution state. As such, it is critical to pursue NRC approval and plant adoption of risk-informed measures to address potential operability concerns that can arise through discovered conditions. This action will be pursued as an integral part of final GSI-191 resolution.
- As efforts to increase in-vessel fuel debris limits are completed and actions to develop risk-informed methods come to fruition, PWRs will consider updating their resolutions to incorporate improved limits and methods.

Industry Action Plan for PWRs with Low to Medium Fibrous Insulation

- Licensees of PWRs that have minimal amounts of fibrous insulation that bypass the containment strainers will provide a docketed submittal to the NRC by December 31, 2012 that outlines a GSI-191 resolution path and schedule. There are approximately 13 sites (18 units) that have incorporated design measures to minimize the amount of fibrous insulation that bypass the containment strainers. These sites generally have fiber bypass quantities that are low but are unable to meet very low in-vessel debris limits.
- The submittal will include a summary of actions and measures that have already been taken to minimize the impact of debris blockage, will identify known areas of conservatism in methods applied to date, and will identify defense-in-depth measures that have been, or will be, taken to mitigate residual risks during the time to complete remaining actions.
- The submittal will identify plans and schedules for testing to revise in-vessel debris limits and a schedule for submittal of GSI-191 closure using the results from this testing.
- As efforts to develop risk-informed methods come to fruition, PWRs will consider updating their resolutions to incorporate improved methods.

We believe the action plan described above provides a balanced approach to resolving GSI-191. We would be happy to meet with the NRC staff to discuss the plan if desired. Please contact me if you have any questions.

Sincerely,



John C. Butler

c: Mr. Jack R. Davis, NRR/DSS, NRC
Mr. Stewart N. Bailey, NRR/DSS/SSIB, NRC